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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/576,999	05/24/2000	Syed Aon Mujtaba	2925-0261P	4786

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EXAMINER

ZEWDU, MELESS NMN

ART UNIT	PAPER NUMBER
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2683

DATE MAILED: 06/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/576,999

Applicant(s)
Mujtaba et al.

Examiner
Meless Zewdu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE three MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on _____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above, claim(s) NONE is/are withdrawn from consideration.
- 5) ☒ Claim(s) NONE is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-23, 25-36, 38, and 39 is/are rejected.
- 7) ☒ Claim(s) 11, 24, and 37 is/are objected to.
- 8) ☒ Claims NONE are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on May 24, 2000 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 6 6) ☐ Other:

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DETAILED ACTION

1. This action is the first on the merit of the instant application.
2. Claims 1-39 are pending in this action.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 4, 8, 12, 13, 14, 16, 17, 21, 25-27, 29, 30, 34, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's admitted prior art (APA) in view of Kalliojarvi (WO 98/19488)..

As per claim 1: the claimed feature is directed to a base station, servicing a macrocell, comprising, at least one steerable N-dimensional antenna ($N \geq 2$) array, co-located with an antenna of said base station, for serving a microcell within the macrocell. The admitted prior (APA) art teaches about localized micro/picocells may be established within overlying macrocells to handle traffic "hot spots" (see page 1, line 14-page 2, line 24). Here, since the macrocell is overlying the microcell, the two types of radio communication cells and their respective antennas can be

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considered as co-located. But, the APA does not explicitly teach about the use of --- steerable N-dimensional ($N \geq 2$ array co-located with the base station antenna, as claimed by applicant.

However, in a related field of endeavor, Kalliojarvi teaches that two dimensional or three dimensional arrays can be used in an antenna (see page 4, lines 6-12) wherein the multi-dimensional antenna array is steerable by phasing the antenna elements (see all the document, particularly, page 5, lines 23-29). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to add Kalliojarvi's steerable multi-dimensional array to the APA's microcell antenna for the advantage, using geometrical rules, of locating a terminal equipment by computing from known values of the antenna array height from the ground and the estimated bearing and elevation angles of a signal received by the antenna array (see page 4, lines 9-12).

As per claim 3: the base station, wherein the microcell includes a hot spot reads on APA (see page 1, lines 14-19).

As per claim 4: the base station, wherein said base station includes a steerable N-dimensional ($N \geq 2$) array for each microcell within the macrocell reads on '090 (see fig. 16A, 16B; col. 7, lines 24-30).

As per claim 8: the base station, wherein said at least one steerable N-dimensional ($N \geq 2$) array serves a hot spot reads on APA (see page 1, lines 14-17). When modified as shown above, said at least one steerable N-dimensional ($N \geq 2$) array, in the base station, will be able to serves a hot spot.

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As per claim 12: the base station, wherein said base station is part of a TDMA system and the macrocell and microcell are separated in one of the frequency and code domain reads on '488 (see page 9, lines 22-36).

As per claim 13: the base station, wherein said base station is a part of CDMA system and the macrocell and the microcell are separated in on of the frequency and code domain reads on '488 (see page 6, lines 11-28; page 9, lines 22-31).

As per claim 14: the features of claim 14 are similar to the features of claim 1, except one difference limitation, the difference of which is provided hereinbelow.

Steering a resultant beam of the at least one steerable N-dimensional array toward the at least one microcell reads on '090 (see fig. 16B; col. 4, line 50-col. 5, line 39; col. 7, lines 24-30).

As per claim 16: the feature of claim 16 is identical with the feature of claim 3. Hence, claim 16 is rejected on the same ground and motivation as claim 3.

As per claim 17: the features of claim 17 are identical with the features of claim 4. Hence, claim 17 is rejected on the same ground and motivation as claim 4.

As per claim 21: the feature of claim 21 is similar to the feature of claim 8. Hence, claim 21 is rejected on the same ground and motivation as claim 8.

As per claim 25: the feature of claim 25 is identical with the feature of claim 12. Hence, claim 25 is rejected on the same ground and motivation as claim 12.

As per claim 26: the feature of claim 26 is identical with the feature of claim 13. Hence, claim 26 is rejected on the same ground and motivation as claim 13.

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As per claim 27: the feature of claim 27 is identical with the feature of claim 1. Hence, claim 27 is rejected on the same ground and motivation as claim 1.

As per claim 29: the base station, wherein the microcell includes a hot spot reads on APA (see page 1, lines 14-19).

As per claim 30: the feature of claim 30 is identical with the feature of claim 4. Hence, claim 30 is rejected on the same ground and motivation as claim 4.

As per claim 34: the feature of claim 34 is identical with the feature of claim 8. Hence, claim 34 is rejected on the same ground and motivation as claim 8.

As per claim 38: the feature of claim 38 is identical with the feature of claim 12. Hence, claim 38 is rejected on the same ground and motivation as claim 12.

As per claim 39: the feature of claim 39 is identical with the feature of claim 13. Hence, claim 39 is rejected on the same ground and motivation as claim 13.

Claims 2, 15 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Kalliojarvi as applied to claims 1, 14 and 27 above, and further in view of Fujii (EP 0 531 090 A2).

As per claim 2: the APA in view of Kalliojarvi do not explicitly teach about the feature wherein the at least one steerable N-dimensional array serving the microcell is co-located on an antenna tower with the antenna serving the macrocell, as claimed by applicant. However, in a related field of endeavor, Fujii teaches about a first small cell being provided in a radio cell (macrocell) by a first antenna provided in a base station, and a second small cell (microcell) which is smaller than

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said first small cell being provided in said first small cell by a second antenna provided in said base station (see col. 2, lines 33-54; figs. 5A; 5B; 5D; 6A; 7A; 11-16C). As can be seen in the figures, the antennas are co-located in a base station and one serves the smaller cell while the other one serves the small cell. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to have a microcell antenna co-located with a macrocell/base station antenna for the advantage of improving the effect of re-use partition of cells (see col. 2, lines 32-32).

As per claim 15: the feature of claim 15 is identical to the feature of claim 2. Hence, claim 15 is rejected on the same ground and motivation as claim 2.

As per claim 28: the feature of claim 28 is similar to the feature of claim 2. Hence, claim 28 is rejected on the same ground and motivation as claim 2.

5. Claims 5, 10, 18, 23, 31 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Kalliojarvi as applied to claims 1, 14 and 27 above, and further in view of examiner's Official Notice.

As per claim 5: some of the features of claim 5 are similar to the features of claim 1. Hence, similar features of claim 5 are rejected on the same ground and motivation as claim 1. The difference limitation calls for --- an N-dimensional digital filter for receiving inputs from the at least two antenna elements and processing the inputs to produce a beam formed output. Examiner believes that filtering signals to remove the unwanted noise/spike and to shape signals up to a better condition for further process is well known in the art of signal processing. Furthermore, it is

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also known digital filters are used to filter digital signals and analog filters are used to filter analog signals. In the instant application, the steerable N-dimensional array utilizes digital signals. The dimension of digital filters is obviously dictated by the dimension of the array being used. Hence, it would have been obvious for one of ordinary skill in the art at the time the invention was made to use an N-dimensional digital filter to filter/process an N-dimensional array a filters since the dimension of the digital filter will be determined by the dimension of the digital array.

As per claim 10: the base station, wherein said at least two antenna elements are arranged in a two-dimensional plane or a surface of a cylinder reads on '488 (see page 4, lines 3-30; page 5, line 23-page 6, line 10; page 9, lines 3-31).

As per claim 18: the features of claim 18 are similar to the features of claim 5. Hence, claim 18 is rejected on the same ground and motivation as claim 5.

As per claim 23: the features of claim 23 are identical with the features of claim 10. Hence, claim 23 is rejected on the same ground and motivation as claim 10.

As per claim 31: the features of claim 31 are similar to the features of claim 5. Hence, claim 31 is rejected on the same ground and motivation as claim 5.

As per claim 36: the features of claim 36 are identical with the features of claim 10. Hence, claim 36 is rejected on the same ground and motivation as claim 10.

6. Claims 6, 7, 19, 20, 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over the APA in view of Kalliojarvi as applied to claims 1, 5, 14, 18, 27 and 31 above, and further in view of examiner's Official Notice and further in view of Searle (US 4,743,871).

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As per claim 6: the references used thus far do not explicitly teach about a base station wherein at least one of inputs and outputs of said at least two antenna elements are weighted to steer a resultant output beam of said at least one steerable N-dimensional array, as claimed by applicant.

However, in a related field of endeavor, Searle teaches about means and method of tapping, weighting, and summing received RF signals using an adaptive filter (see entire document).

Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to add Searle's adaptive filter means to the above modified prior art for the advantage of distinguishing the wanted signal from that of the unwanted (see col. 1, lines 20-22).

As per claim 7: the base station wherein the at least one of inputs and outputs of said at least two antenna elements are weighted using variable filter tap weights reads on '871 (see entire document, particularly, col. 1, lines 23-40; col. 2, lines 15-55).

As per claim 19: the feature of claim 19 is the same as the feature of claim 6. Hence, claim 19 is rejected on the same ground and motivation as claim 6.

As per claim 20: the feature of claim 20 is the same as that of claim 7. Hence, claim 20 is rejected on the same ground as claim 7.

As per claim 32: the feature of claim 32 is the same as the feature of claim 6. Hence, claim 32 is rejected on the same ground and motivation as claim 6.

As per claim 33: the feature of claim 33 is the same as that of claim 7. Hence, claim 33 is rejected on the same ground as claim 7.

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7. Claims 9, 22 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over the above references used in claims 1, 5, 6, 14, 18, 19, 27, 31 and 32 above, and further in view of Grobert (US 5,317,322).

As per claim 9: the above references do not explicitly teach about varying the spread and direction of the resultant output beam of the steerable antenna described above. However, in a related field of endeavor, Grobert teaches about a steerable phased array antenna wherein the resultant beam of the antenna is varied/adjusted by adjustment of the weighting factors (see col. 3, lines 3-61). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to further modify the above references with the teaching of Grobert for the advantage of steering an antenna to a direction that enhancing signal reception.

As per claim 22: the feature of claim 22 is the same as that of claim 9. Hence, claim 22 is rejected on the same ground as claim 9.

As per claim 35: the feature of claim 35 is the same as that of claim 9. Hence, claim 35 is rejected on the same ground as claim 9.

Allowable Subject Matter

8. Claims 11, 24, and 37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meless Zewdu whose telephone number is (703)306-5418. The examiner can normally be reached on week days from 8:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Trost (703)308-5318.

Any response to this action should be mailed to:

Commissioner of Patent and Trademarks

Washington, D.C. 20231

Or faxed to:

(703) 872-9314.

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Six Floor (Receptionist).

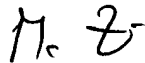
Any inquiry of a general nature or related to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)306-0377.

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¶ 5.03 Reassignment Affecting Application Location

The Art Unit location of your application in the PTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 2683.

Meless Zewdu



Examiner

May 29, 2003.



WILLIAM TROST
SUPERVISOR, PATENT EXAMINER
TECHNOLOGY CENTER 2600